



## Can the dissociative PTSD subtype be identified across two distinct trauma samples meeting caseness for PTSD?

Hansen, M., Mullerova, J., Elklit, A., & Armour, C. (2016). Can the dissociative PTSD subtype be identified across two distinct trauma samples meeting caseness for PTSD? *Social Psychiatry and Psychiatric Epidemiology*, 51(8), 1159-1169. <https://doi.org/10.1007/s00127-016-1235-2>

[Link to publication record in Ulster University Research Portal](#)

**Published in:**  
Social Psychiatry and Psychiatric Epidemiology

**Publication Status:**  
Published online: 11/05/2016

**DOI:**  
[10.1007/s00127-016-1235-2](https://doi.org/10.1007/s00127-016-1235-2)

**Document Version**  
Author Accepted version

**General rights**  
Copyright for the publications made accessible via Ulster University's Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

**Take down policy**  
The Research Portal is Ulster University's institutional repository that provides access to Ulster's research outputs. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact [pure-support@ulster.ac.uk](mailto:pure-support@ulster.ac.uk).

Running head: DISSOCIATIVE PTSD SUBTYPE

Can the dissociative PTSD subtype be identified across two distinct trauma samples meeting caseness for PTSD?

Maj Hansen, Ph.D.<sup>a</sup>

Jana Müllerová MSc<sup>b</sup>

Ask Elklit, Msc<sup>a</sup>

Cherie Armour, Ph.D.<sup>b</sup>

<sup>a</sup> National Centre for Psychotraumatology, Department of Psychology, University of Southern Denmark, Campusvej 55, 5230 Odense M, Denmark

<sup>b</sup> Psychology Research Institute, School of Psychology, Ulster University, Cromore Road, Coleraine, Londonderry BT52 1SA, Northern Ireland

Word count (exc. References, figures and tables): 4,187

\*Corresponding author Maj Hansen, E-mail: [mhansen@health.sdu.dk](mailto:mhansen@health.sdu.dk), Phone: 0045-65502303

## Abstract

For over a century, the occurrence of dissociative symptoms in connection to traumatic exposure has been acknowledged in the scientific literature. Recently, the importance of dissociation has also been recognized in the long-term traumatic response within the DSM-5 nomenclature. Several studies have confirmed the existence of the dissociative posttraumatic stress disorder (PTSD) subtype. However, there is a lack of studies investigating latent profiles of PTSD solely in victims with PTSD. *Purpose and method.* The current study investigates the possible presence of PTSD subtypes using latent class analysis (LCA) across two distinct trauma samples meeting caseness for DSM-5 PTSD based on self-reports ( $N = 787$ ). Moreover, we assessed if a number of risk factors resulted in an increased probability of membership in a dissociative compared to a non-dissociative PTSD class. *Results.* The results of LCA revealed a two-class solution with two highly symptomatic classes: a dissociative and a non-dissociative class across both samples. Increased emotion-focused coping increased the probability of individuals being grouped into the dissociative class across both samples. Social support reduced the probability of individuals being grouped into the dissociative class but only in the victims of motor vehicle accidents (MVA) suffering from whiplash. *Conclusions.* The results are discussed in light of their clinical implications and suggest that the dissociative subtype can be identified in victims of incest and victims of MVA suffering from whiplash meeting caseness for DSM-5 PTSD.

Key words: PTSD, dissociation, subtype, latent class analysis

For over a century, the occurrence of dissociative symptoms in connection to traumatic exposure has been acknowledged in the scientific literature [1]. Dissociation can be defined as “an experienced loss of information or control over mental processes that, under normal circumstances, are available to conscious awareness, self-attribution, or control, in relation to the individual’s age and cognitive development” (p. 251) [2]. Numerous studies have found an association between dissociation and both acute and long-term posttraumatic stress symptoms across multiple forms of traumatic exposures [2-5]. The importance of dissociation in response to trauma was first formally recognized in relation to the early traumatic stress response with the introduction of acute stress disorder in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) [6]. More recently the importance of dissociation has also been recognized in longer-term traumatic responding [7]. Indeed, the DSM-5 PTSD diagnosis has undergone several revisions including the addition of two dissociative symptoms of depersonalization and derealization; culminating in a dissociative subtype.

Recently a growing body of latent profile analytic (LPA) studies investigating the existence of the dissociative PTSD subtype and associated covariates have started to emerge [8-14]. In general, studies have identified three to five profiles of individuals; one of which supports the existence of the dissociative PTSD subtype (6 % to 30 %). The majority of prior studies have been based on relatively homogenous trauma samples within interpersonal violence [8, 9, 12-14], with one study utilizing a sample of trauma-exposed college students [10] and another using a community sample [11]; note that the specific type of traumatic exposure was not specified in the latter study. Importantly, the majority of the studies investigated PTSD subtypes using DSM-IV criteria [8-10, 12-14] despite the dissociative subtype being a unique feature within the DSM-5. Moreover, the majority of the studies included participants with and without PTSD according to the DSM-IV [8-10, 12, 14] with estimated prevalence rates ranging from 12% to 90%. Notably, both Blevins et al. [10] and Wolf et al. [14] yielded similar classifications using their total samples and samples restricted to those meeting PTSD criteria. However, these subsamples were rather small ( $N = 123-206$ ) compared to the number of indicators (20-27). Indeed, only Frewen et al. [11] used a DSM-5 measurement of PTSD (i.e. PTSD Checklist: [15]) and included only victims meeting cut-off scores for a probable PTSD diagnosis. In contrast to previous dissociative PTSD subtype studies, Frewen et al. [11] identified two dissociative subtypes of which one was a highly symptomatic and the other more moderately symptomatic. However, the use of cutoff scores in this regard allows for a greater diversity in participants as it is possible to meet the cut-off scores for DSM-5 PTSD caseness without meeting the diagnostic criteria for each symptom cluster.

As argued by Hansen, Armour and Elklit [16] it is possible that the latent structure of posttraumatic stress symptoms may differ in clinical samples compared to mixed samples. Indeed, the latent structure of PTSD has been found to differ in veterans with and without PTSD [17]. There is therefore a need for research investigating whether a dissociative PTSD subtype is also evident in relation to DSM-5 criteria within a wider range of trauma samples meeting caseness for DSM-5 PTSD. This is important for clinical practice as preliminary research suggests that dissociative symptoms can affect the success of PTSD treatments and thus there is utility in the identification of dissociative symptoms in victims of traumatic exposure with clinical levels of PTSD [18]. Thus subsequent to identifying the presence of a dissociative subtype it is also important to ascertain which characteristics may or may not increase the risk of developing dissociative PTSD compared to non-dissociative PTSD so that preventive measures and early treatment can be facilitated. Indeed, several studies have investigated and identified covariates associated with the dissociative PTSD subtype [8-14].

The aims of the present study were twofold. The first aim was to investigate the existence of a dissociative PTSD subtype using LCA across two distinct trauma samples meeting caseness for DSM-5 PTSD based on self-report. The two trauma samples were victims of incest and victims of traffic accidents suffering from whiplash. To the best of our knowledge dissociative PTSD has not previously been investigated following these specific forms of traumatic exposure. Based on the existing research, we expected to find at least one dissociative subtype marked by both severe PTSD and dissociative symptoms in addition to intermediate symptomatic classes but no low symptomatic class due to the symptomatic nature of the sample. The second aim was to investigate covariates associated with the identified PTSD profiles. These covariates were selected based on previously reported LPA PTSD research, and research linking these factors to posttraumatic stress symptoms and dissociation [5, 19-26]. The selected covariates were sex, age, social support, coping style and attachment patterns. We expected that female sex, younger age, attachment anxiety, lack of social support, emotional coping, and the lack of rational coping would increase the risk of membership to the most symptomatic class; perhaps the dissociative PTSD subtype.

## **Method**

### **Participants**

Participants meeting the diagnostic criteria for DSM-5 PTSD from two separate samples were assessed in the current study. All necessary permissions for conducting this study, according to Danish Law, were obtained.

**Sample 1. Traffic accidents victims.** The first sample comprised victims exposed to road traffic accidents on average 62 months prior to participating in the study and suffering from whiplash recruited through the Danish Society for Polio, Traffic and Accident Victims ( $N = 1664$ ) (see Elklit & Shevlin [27] for further details). All members of the society were contacted via post and were asked to complete the enclosed questionnaires. Five hundred and twelve (31.2 %) participants met the PTSD DSM-5 criteria.

**Sample 2. Incest victims.** The second sample comprised victims of incest recruited through four Danish Incest support centers ( $N = 503$ ) (see Elklit, Christiansen, Palic, Karsberg, & Eriksen [28] for further details). The centers serve as outpatient units and are intended for individuals who were sexually abused in childhood. All individuals receiving therapy at the centers were asked to complete questionnaires, which informed the subsequent therapy planning. A total of 357 (70.6 %) participants met the PTSD DSM-5 criteria.

## Measures

**DSM-5 PTSD symptoms.** In accordance with Hansen, Hyland, Armour, Shevlin and Elklit [29] we assessed DSM-5 PTSD symptoms with items from the Harvard Trauma Questionnaire Part IV (HTQ; [30]). Furthermore, we added items from the revised Trauma Symptom Checklist (TSC; [31, 32]) to assess dissociative symptoms and the E2 criterion (see table 1).

[PLEASE INSERT TABLE 1 HERE]

The HTQ comprises 31-items designed to assess DSM-IV PTSD symptoms and more general posttraumatic stress symptoms. Answers are rated on a four-point Likert-type scale (1 = *not at all*, to 4 = *all the time*). Although designed to reflect the DSM-IV, the additional items in the HTQ largely reflect the newly introduced PTSD symptoms in the DSM-5. The TSC measures general psychological distress rated on a four-point Likert scale (1 = *never*, 4 = *always*). The TSC originally comprised 33 items; however, Elklit [32] added two more items. As shown in table 1 the TSC was used to measure the E2 criterion and the two dissociative symptoms in the dissociative subtype (i.e. derealization and depersonalization). The Danish version of the HTQ and the TSC has been used in a wide range of trauma populations with reports of good reliability and validity [33, 32]. Cronbach alpha values ( $\alpha$ ) were satisfactory for the HTQ ( $\alpha = .85-.86$ ) and the TSC ( $\alpha = .87-.89$ ) total scores across the two samples. The diagnostic DSM-5 criteria for PTSD are met if the participants endorse at least 1 symptom of intrusion, 1 symptom of avoidance, 2 symptoms of negative cognitions and

mood, and two arousal symptoms, all indicated by item scores  $\geq 3$  on the HTQ or the TSC for the E2 symptoms as done originally in relation to the DSM-IV.

**Covariates.** The following covariates were assessed across both samples.

Perceived social support was assessed using the Danish version of the Crisis Support Scale (CSS; [34]) which is comprised of seven items rated on a 7-point Likert-type scale (1 = *never*, to 7 = *always* (7) on the first six items, and 1 = *very unsatisfied*, to 7 = *very satisfied* on the last item). The CSS has been shown to have good reliability and validity [34, 35]. The Cronbach's alpha value was satisfactory (total score = .71-.79).

The revised Danish version of the Coping Styles Questionnaire (CSQ; [36]) was used to assess rational, emotion-focused, avoidant, and detached coping with 37 items rated on a 4-point Likert-type scale (1 = *never* to 4 = *always*; [37]). . The Danish CSQ has been shown to have good reliability and validity [37]. The reliability coefficients in the current study were satisfactory for rational and emotion-focused coping ( $\alpha = .76-.84$ ) in both samples, but not for avoidant ( $\alpha = .59-.65$ ) and detached coping ( $\alpha = .60-.67$ ), which were excluded from further analysis.

Attachment style was assessed as attachment anxiety and avoidance using the Revised Adult Attachment Scale (RAAS; [38, 39]). The RAAS consists of 18 items rated on a 5-point Likert-type scale (1 = *not at all characteristic of me* to 4 = *very characteristic of me*) with high scores indicating a negative view of self and others, respectively. The RAAS has good validity and reliability with test-retest correlations between .52 and .71 [39]. Cronbach's alpha values in the present study were satisfactory for the anxiety subscale (.73-.83), but not the avoidance subscale (.59-.69), which was excluded from further analysis.

### Missing Data

The overall amount of missing data was low (1.2% - 2.2%) across the two samples. Prior to any analyses, we excluded participants who had more than 30% of missing values on any one scale or were missing age or sex (36 victims of MVA suffering from whiplash; 46 victims of incest). The remaining missing data were accounted for using the EM procedure in SPSS 22. This resulted in the effective sample size of 476 whiplash survivors and 311 incest survivors.

### Data analysis

We conducted latent class analyses (LCAs) to identify underlying latent profiles of PTSD and dissociative symptom endorsements, corresponding to DSM-5 criteria. All PTSD and dissociation indicators were binary coded prior to the analysis. Latent class models comprising between 1 and 6 classes were specified separately for the two samples. Models were subsequently compared across a variety of fit indices; the Akaike Information Criteria (AIC), the Bayesian Information Criteria (BIC), the sample size-adjusted BIC (SSABIC), Entropy, and the Lo-Mendell-Rubin-Adjusted likelihood ratio (LMR-A) test. Following established guidelines, models displaying lower values of the AIC, BIC, and SSABIC are deemed indicative of superior fitting models [40-42]. Raftery [43] highlighted that a model with a 10-point lower BIC value has a 150:1 likelihood to be the better fitting model. Higher entropy values approaching 1 are deemed to indicate clearer participant classification across profiles. In addition, a non-significant LMR-A value indicates that a solution with one less class may be the more optimal solution for the data. In deciding which model was optimal, further consideration of the parsimony and the substantive meaning of the resultant solutions are required [41]. Chi-square tests for independence were used to examine the significant differences between the resulting classes in the endorsement of the PTSD and dissociation indicators.

Finally, using the optimal model, we used the three-step approach [44] for conducting the binary logistic regression in order to examine the risk factors for the latent class membership. In the first step, the optimal LCA model is fitted as described above. The second step involves assigning participants to their most likely class based on the posterior distribution of the latent class variable. In the third step, the binary logistic regression model was fitted, where the covariates were included as predictors of the latent classes, taking into account the error associated with categorizing individuals into their most likely class. All models were estimated using the robust maximum likelihood estimator in Mplus 7.3 [45].

## Results

Table 2 shows descriptive statistics for the whiplash and incest samples.

[Please insert Table 2 here]

### Latent Class Analysis



LCAs utilized the 19 indicators of PTSD (one indicator combined B4 & B5) and two indicators from TSC to represent depersonalization and derealization. For each sample, models were compared based on the above mentioned fit indices. Table 3 shows the results for the Whiplash sample. The BIC value was the lowest for the 2-class solution. The values of AIC and SSABIC kept decreasing, but the decrements after the 2-class solution were relatively small. The LMR-A test suggested that the 3-class solution may be optimal, but upon the visual inspection of the 3-class model and the lower BIC value we opted for the more parsimonious 2-class solution with clearly delineated and meaningful classes.

[Please insert Table 3 here]

Figure 1 shows the probabilities of endorsing the PTSD and dissociation indicators in the two classes of the Whiplash sample. Based on the posterior probabilities, 62.6% ( $n = 298$ ) of participants were categorized into the non-dissociative PTSD class and 37.4% ( $n = 178$ ) were categorized into the dissociative PTSD class. The pattern of endorsing the PTSD items was very similar in both classes with the lowest scores on E2 (reckless or self-destructive behavior), but the probability of endorsing the two dissociative items of depersonalization and derealization was higher in the dissociative PTSD group. Chi-square tests showed that for the whiplash sample there were significant ( $p < .05$ ) associations between class membership and endorsement of all the PTSD and dissociation indicators, except for the endorsement of E5 (difficulty concentrating;  $p = 1.000$ ). The pattern of the results was the same across all significant associations; individuals in the dissociative class were more likely than the non-dissociative class to endorse the symptoms. Effect sizes were small to large ( $\phi = .11$  to  $.55$ ).

[Please insert Figure 1 here]

Table 3 also shows the results of the LCAs for the incest sample. The BIC value was the lowest for the 2-class solution. The values of SSABIC and AIC were decreasing up to the 5-class solution, but the decrements were small after the 2-class model. The LMR-A test was significant only for the 2-class solution, which was selected as optimal.

Based on the posterior probabilities, 55.4% ( $n = 172$ ) of incest survivors were categorized into the non-dissociative PTSD class and 44.6% ( $n = 139$ ) were categorized into the dissociative PTSD class. The probabilities of endorsing the

PTSD and dissociation items in the two classes of the incest sample are presented in Figure 2. The pattern of endorsing the PTSD items was similar in both classes with the lowest scores on E2 (reckless or self-destructive behavior), but the probability of endorsing the two dissociative items of depersonalization and derealization was higher in the dissociative PTSD group. Chi-square tests showed that for the incest sample there were significant ( $p < .05$ ) associations between class membership and endorsement of all the PTSD and dissociation indicators, except for the endorsement of C1 (efforts to avoid thoughts,  $p = .349$ ), D1 (trauma related amnesia;  $p = .371$ ), and E1 (irritability/anger;  $p = .059$ ). The pattern of the results was the same across all significant associations; individuals in the dissociative class were more likely than the non-dissociative class to endorse the symptoms. Effect sizes were small to large ( $\phi = -.18$  to  $-.52$ ).

[Please insert Figure 2 here]

### Binary logistic regression

The results of the binary logistic regression for the whiplash sample and the incest sample are presented in Table 4. Emotion-focused coping style was a significant risk factor for membership in the dissociative PTSD class relative to the non-dissociative PTSD class in both samples. Specifically, for each one point increase on the measure of emotion-focused coping victims were (1.45 and 1.31 times) more likely to be in the dissociative PTSD class across both samples. Furthermore, rational coping styles were found to be a significant risk factor for membership in the dissociative PTSD class in the incest sample. This was unexpected and thus additional analyses were performed. Independent samples t-tests and Pearson's correlation analyses showed that there were no significant difference ( $t(309) = 0.66$ ,  $p = .510$ ) or correlation ( $r = -.04$ ,  $p = .510$ ) between the groups and rational coping. Furthermore, rational coping was not significantly associated with PTSD severity ( $r = -.07$ ,  $p = .201$ ). Combined this suggests that the results of the binary logistic regression analysis in relation to rational coping was likely to be a statistical artefact and not to be trusted. Finally, social support was found to be a protective factor against membership of the dissociative PTSD class in the whiplash sample; for each one point increase on the social support scale, individuals were less likely to be in the dissociative PTSD class relative to the non-dissociative PTSD class.

[Please insert Table 4 here]

### Discussion

To the best of our knowledge the current study is the first study to investigate 1) the existence of a possible dissociative PTSD subtype and 2) associated covariates in two distinct trauma samples of victims of incest and victims of MVA suffering from whiplash meeting caseness for DSM-5 PTSD. The first aim was investigated using LCA and the second aim was investigated using binary logistic regression analyses. The LCA favored a two-class solution in both samples with two highly symptomatic PTSD classes termed dissociative PTSD and non-dissociative PTSD. The dissociative PTSD class had overall significantly higher scores on PTSD severity with especially higher scores on the two dissociative items compared to the non-dissociative PTSD class in both samples. Furthermore, the dissociative subtype had significantly higher probability of symptom endorsement on all PTSD symptoms and dissociative symptoms across both samples except for the E5 criterion in the whiplash sample and the C1, E1, and D1 criteria in the incest sample where no significant differences were identified. Furthermore, both classes scored very low on the E2 criterion of reckless and self-destructive behavior in the two samples. Secondly, the results of binary logistic regression analyses identified emotion-focused coping as a risk factor which increased the probability of membership in the dissociative PTSD classes compared to the reference group (non-dissociative PTSD) across both samples. Additionally, social support was identified as a protective factor against membership of the dissociative PTSD class in the whiplash sample only.

The results of LCAs yielded further support in accordance with the DSM-5 criteria for the existence of a distinct dissociative PTSD class and a non-dissociative PTSD class in victims meeting caseness for self-reported PTSD. Contrary to previous studies, we did not identify any low symptomatic class or intermediate symptomatic classes. The lack of an identification of a low symptomatic class was expected due to the clinical nature of our sample compared to previous research, whereas the lack of intermediate classes is more likely to be attributed to the use of LCA. LCA uses less information per indicator compared to LPA as LCA uses binary data whereas LPA uses continuous data. There will therefore naturally be more information and thus a greater spread of scores per item using LPA compared to LCA, which makes it easier to differentiate between individuals and thus results in a greater number of cases.

Furthermore, we found a higher estimated prevalence rate of dissociative PTSD (i.e. 37.4 – 44.6 %) than the ones identified in previous LPA studies (i.e. 6-30 %) [8-14]. This is likely to be attributed to the highly symptomatic nature of the samples used in the current study. Higher estimated prevalence rates of dissociative PTSD have a tendency to be found within clinical samples compared to nonclinical samples [10, 11, 13]. To the best of our knowledge the current study and

the Frewen et al. [11] are the only studies assessing PTSD subtypes in samples meeting caseness for PTSD using DSM-5 criteria. Contrary to Frewen et al. [11] we identified only one dissociative subtype. This difference may be attributed to the fact that Frewen et al. [11] used cut-off scores rather than diagnostic criteria to select participants with PTSD. Thus, as stated by Frewen et al. [11] their study focused more on cases with at least moderate PTSD symptoms rather than a possible PTSD diagnosis. This could potentially mean that the individuals in the Frewen et al. [11] study had a bigger spread on PTSD symptom constellations and thus less similar profiles than we found using diagnostic criteria. The difference may also be due to the use of different statistical analyses. We used LCA, whereas Frewen et al. [11] used LPA. Finally, the difference between the current study and the existing research in dissociative PTSD may also be attributed to the fact that a higher proportion of the PTSD cases in both the whiplash and the incest samples may correspond to chronic PTSD cases than the samples included in previous research. Indeed, several years have passed since the traumatic exposure within the current two samples.

Interestingly all the identified classes in the current study scored low on the E2 criterion for reckless or self-destructive behavior. Although this is in accordance with the Miller et al. [46] and Liu et al. [47] studies which both show that the E2 criterion appears not to be a good marker of PTSD (i.e. the E2 criterion has rather low loadings on its corresponding factor across the different investigated models), the results of the current study should be interpreted with caution in relation to the E2 criterion. Of note the results may be related to how we assessed the E2 criterion as we were only able to assess the E2 criterion in a rather specific manner. According to the DSM-5 the E2 criterion concerns both reckless and self-destructive behavior. However, we only assessed a specific form of self-destructive behavior (i.e. self-harm) rather than general reckless behavior. At the same time, our measurement of the E2 criterion is further limited by the fact that our measure of self-harm required intent or self-awareness to self-harm which is not required by the E2 criterion. Hence the results should be interpreted with caution in relation to the E2 criterion. In a similar vein, the three symptoms of negative cognitions and mood (D2, D4, and D7) were assessed rather specific compared to the broader description stated by the DSM-5. Finally, we also assessed physiological and psychological reactivity to reminders of the traumatic event (the B4 and B5 criteria) with only one item. Although, emotional and physiological reactivity are found to be highly correlated and difficult to separate in clinical practice [48] it cannot be ruled out that this could have affected the results. Furthermore, dissociation was assessed with only two items. It is questionable whether such a complex phenomenon as dissociation can be captured using two single items, however, the specific two items used in this study do measure depersonalization and

derealization as specified in the DSM-5 (APA, 2013). Despite these weaknesses connected to our measurement of PTSD symptoms, we argue that it is better to seek to test the latent structure of PTSD using criteria that bare close resemblance to the DSM-5 criteria rather than the DSM-IV criteria as done in most of the existing studies. At the same time, although not a perfect measure for the DSM-5 the combined HTQ and TSC do create symptomatology that is covered by the DSM-5.

In assessing covariates associated with probability of belonging to dissociative PTSD classes we found in both samples that the use of emotion-focused coping significantly increased the probability of dissociative class membership in both samples. This is not surprising as emotion-focused coping has been found positively associated with both dissociation and PTSD [21, 24]. Furthermore, it has been argued that many coping measures including emotion-focused coping may confound with an emotional outcome and thus also explain the strong association between PTSD severity and emotion-focused coping [24, 49]. However, emotion-focused coping was not a particularly strong risk factor for membership of the dissociative PTSD class, which suggests that stronger risk factors need to be identified. In accordance with previous research [24-25] showing that social support is negatively associated with both PTSD and dissociation, social support significantly reduced the risk of dissociative PTSD class membership in the whiplash sample. However, social support was not a significant protective factor of dissociative PTSD in the incest sample. This difference in the results between the samples is likely to reflect differences in the nature of the traumatic exposure. Incest often involves the betrayal by someone the victim knows and at the same time victims of incest are often threatened into silence, which unfortunately can make victims of incest less likely to both have and use supportive social networks. Indeed, studies show that negative perceptions and lack of social support can increase PTSD severity in victims of incest [28]

The results of the current study have several clinical implications. Combined with the growing body of research in this area the results suggest that PTSD subtypes do exist. Furthermore, the results of the current study suggest that when assessing PTSD subtypes in victims meeting caseness for DSM-5 PTSD according to self-report only two subtypes are identified as specified by the DSM-5: a non-dissociative PTSD class and a dissociative PTSD class. As mentioned, preliminary research already suggested that dissociative symptoms can affect the success of PTSD treatments [18] but not all [50], thus it is important that clinicians screen for the dissociative subtype and plan treatment accordingly. Although, our measurement of the E2 criterion only measures a specific part of the E2 criterion, the results are in accordance with previous research suggesting that the E2 criterion may not be a particularly good marker of PTSD [46-47]. This suggests that

clinicians should be aware of the possibility that victims suffering from PTSD may be less likely to display this symptom. Additionally, the results of the current study are interesting in light of the situation that the field of psychotraumatology will be facing the release of the ICD-11 PTSD diagnostic criteria in 2017 [51]. Indeed, two standard diagnostic nomenclatures with rather different descriptions of the same disorder will then exist. In contrary to the DSM-5 PTSD diagnostic criteria, the proposed diagnostic criteria for ICD-11 PTSD include only six symptoms belonging to three clusters (i.e. re-experiencing, avoidance, and excessive hypervigilance or an enhanced startle reaction [51]). Several studies across multiple trauma samples have provided support for the ICD-11 proposals [52-54]. However, dissociation is not described as a symptom for proposed ICD-11 PTSD diagnosis but instead dissociative symptoms are included in the proposed description of complex PTSD. Thus there is a risk of overlooking important symptoms relying solely on the ICD-11 PTSD criteria which may in return complicate treatment. Future research is needed to shed more light on this.

### **Limitations**

The present study has several limitations. Firstly, the PTSD symptoms were not assessed using a validated DSM-5 PTSD measurement. Of note, we used a DSM-IV PTSD self-report measurement (the HTQ) and a single item from the TSC to assess DSM-5 PTSD. Secondly, two single items from the TSC were used to measure dissociation, the B4 and the B5 criterion were assessed with one item, and the E2, D2, D4, and D7 criterion were assessed rather specific. The specific items on the HTQ and the TSC bare very close resemblance with the DSM-5 PTSD criteria and should constitute a PTSD symptomatology that should be covered by the DSM-5. However, potential bias connected to using these measurements cannot be ruled out. Thirdly, although the samples were distinct trauma samples it is still unknown whether the results can be generalized beyond the Danish context. Finally, unfortunately we were unable to control for the effect of time. Thus, it is unknown if the results can be generalized to samples of less chronic nature.

### **Conclusion**

The current study is the first study to investigate latent classes of DSM-5 PTSD diagnosis in two samples of victims of distinct traumatic exposures meeting caseness for DSM-5 PTSD based on self-report. We found support for a two class solution with a dissociative PTSD class and a non-dissociative PTSD class. Further research is needed to investigate latent profiles and classes of PTSD in victims suffering from PTSD, but the current study suggests that the dissociative PTSD subtype can also be clearly identified in victims of incest and victims of MVA suffering from whiplash and meeting caseness for DSM-5 PTSD.

**Ethical standards**

The studies were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

**Conflict of interest**

The authors declare that they have no conflict of interest.

## References

1. Janet P (1907) The major symptoms of hysteria. McMillan: New York.
2. Cardena E, Carlson E (2011) Acute stress disorder revised. *Annu Rev Clin Psycho*, 7:245-267. doi: 10.1146/annurev-clinpsy-032210-104502
3. Breh DC, Seidler GH (2007) Is peritraumatic dissociation a risk factor of PTSD? *Journal of Traum and Dissociation*, 8:53-69. doi: 10.1300/J229v08n01\_04
4. Dalenberg CJ, Brand BL, Gleaves DH et al (2012) Evaluation of the Evidence for the Trauma and Fantasy Models of Dissociation. *Psychol Bull*, 138:550-558. doi: 10.1037/a0027447
5. Ozer EJ, Best SR, Lipsey TL, Weiss DS (2003) Predictors of posttraumatic stress disorder and symptoms in Adults: A meta-Analysis. *Psychol Bull*, 129:52-73. doi: 10.1037/0033-2909.129.1.52
6. American Psychiatric Association (1994) *Diagnostic and Statistical Manual of Mental Disorders*, 4<sup>th</sup>ed. Washington DC: American Psychiatric Association.
7. American Psychiatric Association (2013) *Diagnostic and Statistical Manual of Mental Disorders*, 5<sup>th</sup>ed. Washington DC: American Psychiatric Association.
8. Armour C, Elklit A, Lauterbach D, Elhai JD (2014) The DSM-5 dissociative-PTSD subtype: can levels of depression, anxiety, hostility, and sleeping difficulties differentiate between dissociative-PTSD and PTSD in rape and sexual assault victims? *J Anxiety Disord*, 28:418-426. doi: 10.1016/j.janxdis.2013.12.008
9. Armour C, Karstoft K, Richardson D (2014) The co-occurrence of PTSD and dissociation: differentiating severe PTSD from dissociative-PTSD. *Soc Psych Psych Epid*, 49:1297-1306. doi: 10.1007/s00127-014-0819-y
10. Blevins CA, Weathers FW, Witte TK (2014) Dissociation and posttraumatic stress disorder: a latent profile analysis. *J Trauma Stress*, 27:388-396. doi: 10.1002/jts.21933
11. Frewen PA, Brown MFD, Steuwe C, Lanius RA (2015) Latent profile analysis and principal axis factoring of the DSM-5 dissociative subtype. *European Journal of Psychotraumatology*, 6:26406. doi: 10.3402/ejpt.v6.26406
12. Steuwe C, Lanius RA, Frewen PA (2012) Evidence for a dissociative subtype of PTSD by latent profile and confirmatory factor analyses in a civilian sample. *Depress Anxiety*, 29:689-700. doi: 10.1002/da.21944
13. Wolf EJ, Lunney A, Miller MW, Resick PA, Friedman MJ, Schnurr PP (2012) The dissociative subtype of PTSD: A replication and extension. *Depress Anxiety*, 29:679–688. doi: 10.1002/da.21946



14. Wolf EJ, Miller MW, Reardon AF, Ryabchenko KA, Castillo D, Freund R (2012) A latent class analysis of dissociation and posttraumatic stress disorder evidence for a dissociative subtype. *Arch Gen Psychiat*, 69:698–705.
15. Weathers FW, Litz BT, Keane TM, Palmieri PA, Marx BP, Schnurr PP (2013) The PTSD checklist for DSM-5 (PCL-5). Scale available from the national center for PTSD. Retrieved May 25 2015 from <http://www.ptsd.va.gov>
16. Hansen M, Armour C, Elklit A (2012) Assessing a dysphoric arousal model of acute stress disorder symptoms in a clinical sample of rape and bank robbery victims. *European Journal of Psychotraumatology*, 3.  
doi:10.3402/ejpt.v3i0.18201
17. Biehn T, Elhai JD, Fine TH, Seligman LD, Richardson JD (2012) PTSD factor structure differences between veterans with or without a PTSD diagnosis. *J Anxiety Disord*, 26:480-485.  
<http://dx.doi.org/10.1016/j.janxdis.2012.01.008>
18. Bovin MJ, Marx BP, Schnurr PP (2015) Evolving DSM diagnostic criteria for PTSD: Relevance for assessment and treatment. *Current Treatment Options in Psychiatry*, 2:86-98. doi: 10.1007/s40501-015-0032-y
19. Armour C, Elhai JD, Layne CM, Shevlin M, Duraković-Belko E, Djapo N, Pynoos RS (2011) Gender differences in the factor structure of Posttraumatic Stress Disorder symptoms in war-exposed adolescents. *J Anxiety Disord*, 25:604-611. doi: 10.1016/j.janxdis.2011.01.010
20. Brewin CR, Andrews B, Valentine JD (2000) Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *J Consult Clin Psych*, 68:748-766. doi: 10.1037//0022-006x.68.5.748
21. Christiansen DM, Elklit A, Olff M (2013) Parent bereaved by infant death: PTSD symptoms up to 18 years after the loss. *Gen Hosp Psychiat*, 35:605-611. doi: 10.1016/j.genhosppsy.2013.06.006
22. Dieperink M, Leskela J, Thuras P, Engdahl B (2001) Attachment style classification and posttraumatic stress disorder in former prisoners of war. *Am J Orthopsychiat*, 71:374-378. doi: <http://dx.doi.org/10.1037/0002-9432.71.3.374>
23. Fraley RC, Fazzari DA, Bonanno GA, Dekel S (2006) Attachment and psychological adaptation in high exposure survivors of the September 11th attack on the World Trade Center. *Pers Soc Psychol B*, 32:538-551. doi: 10.1177/0146167205282741

24. Hansen M, Elklit A (2014) Who develops posttraumatic stress symptoms following bank robbery? In Simmons, JP (Ed). *Banking: Performance, Challenges and Prospects for Development*, Hauppauge New York: Nova Science Publishers Inc.
25. Simeon D, Greenberg J, Nelson D, Schmeidler J, Hollander, E (2005) Dissociation and posttraumatic stress 1 year after the world trade center disaster: follow-up of a longitudinal survey. *J Clin Psychiat*, 66:231-237. doi: 10.4088/JCP.v66n0212
26. Tolin DF, Foa E (2006) Sex differences in trauma and posttraumatic stress disorder: A quantitative review of 25 years of research. *Psychol Bull*, 132:959–992. doi: 10.1037/0033-2909.132.6.959
27. Elklit A, Shevlin M (2007). The structure of PTSD symptoms: A test of alternative models using confirmatory factor analysis. *British Journal of Clinical Psychology*, 46: 299-313. doi: 10.1348/014466506X171540
28. Elklit A, Christiansen DM, Palic S, Karsberg S, Eriksen SB (2014) Impact of traumatic events on posttraumatic stress disorder among Danish survivors of sexual abuse in childhood. *Journal of Child Sexual Abuse*, 23:918-934. doi: 10.1080/10538712.2014.964440
29. Hansen M, Hyland P, Armour C, Shevlin M, Elklit A (2015) Less is more? Assessing the validity of the ICD-11 model of PTSD across multiple trauma samples. *European Journal of Psychotraumatology*, 6:28766. doi: 10.3402/ejpt.v6.28766
30. Mollica RF, Caspi-Yavin Y, Bollini P, Truong T, Tor S, Lavelle J (1992) Harvard Trauma Questionnaire. *J Nerv Ment Dis*, 180:111-116.
31. Briere J, Runtz M (1989) The Trauma Symptom Checklist (TSC-33): Early data on a new scale. *J Interpers Violence*, 4:151-163. doi: 10.1177/088626089004002002
32. Elklit A (1990) Måling af belastninger efter voldeligt overfald med TSC-33 [traume symptom checkliste[Measuring Distress After Violent Assault with TSC-33]. *Nordisk Psykologi*, 42:281-289.
33. Bach M (2003) En empirisk belysning og analyse af “Emotionel Numbing” som eventuel selvstændig faktor i PTSD. [An empirical illumination and analysis of emotional numbing as an independent factor in PTSD]. *Psykologisk studieskriftserie*, 6:1-199.

34. Joseph S, Andrews B, Williams R, Yule W (1992) Crisis support and psychiatric symptomatology in adult survivors of the Jupiter cruise ship disaster. *Brit J Clin Psychol*, 31:63-73. doi: 10.1111/j.2044-8260.1992.tb00968.x
35. Elklit A, Pedersen SS, Jind L (2001) The crisis support scale: Psychometric qualities and further validation. *Pers Individual Differ*, 31:1291-1302. doi: 10.1016/S0191-8869(00)00220-8
36. Roger D, Jarvis G, Narajian B (1993). Detachment and coping: The construction of a new scale for measuring coping strategies. *Pers Indiv Differ*, 15:619-626. doi: 10.1016/0191-8869(93)90003-L
37. Elklit A (1996) Coping styles questionnaire: A contribution to the validation of a scale for measuring coping strategies. *Pers Indiv Differ*, 21:809-812. doi: 10.1016/0191-8869(96)00123-7
38. Collins NL (1996) Working models of attachment: Implications for explanation, emotion, and behaviour. *J Pers Soc Psychol*, 58:810-832. doi: 10.1037/0022-3514.71.4.810
39. Collins NL, Read SJ (1990) Adult attachment, working models, and the relationship quality in dating couples. *J Pers Soc Psychol*, 58:644-663. doi:10.1037/0022-3514.58.4.644
40. Nylund K, Asparouhov T, Muthén BO (2007) Deciding on the number of classes in latent class analysis and growth mixture modeling: A monte-carlo simulation study. *Struct Equ Modeling*, 14:535-569.
41. Nylund K, Bellmore A, Nishina A, Graham S (2007) Subtypes, severity, and structural stability of peer victimization: What does latent class analysis say? *Child Dev*, 78:1706-1722.
42. Yang C (2006) Evaluating latent class analysis models in qualitative phenotype identification. *Computational Statistics and Data Analysis*, 50:1090-1104. doi: 10.1016/j.csda.2004.11.004
43. Raftery AE (1995) Bayesian model selection in social research. *Sociol Methodol*, 25:111-163.
44. Asparouhov T, Muthén BO (2014) Auxiliary variables in mixture modeling: A 3-step approach using Mplus. *Mplus Web Notes* (No. 15, Version 8). Retrieved from [www.statmodel.com](http://www.statmodel.com)
45. Muthén LK, Muthén BO (1998-2013) *Mplus user's guide* (7<sup>th</sup> ed). Muthén & Muthén, Los Angeles.
46. Miller MW, Wolf EJ, Kilpatrick D, Resnick H, Marx B, & Friedman, M J (2013). The prevalence and latent structure of proposed DSM–5 posttraumatic stress disorder symptoms in U.S. national and veteran samples. *Psychological Trauma: Theory, Research, Practice, and Policy*, 5: 501–512. doi: 10.1037/a0029730

47. Liu P, Wang L, Cao CR et al. (2014). The underlying dimensions of DSM-5 posttraumatic stress disorder symptoms in an epidemiological sample of Chinese earthquake survivors. *Journal of Anxiety Disorders*, 28: 345-351. doi: 10.1016/j.janxdis.2014.03.008
48. Hansen M, Andersen TE, Armour C, Elklit A, Palic S, Mackrill T, (2010) PTSD-8: A Short PTSD Inventory. *Clinical Practice and Epidemiology in Mental Health*, 6:101-108. doi: 10.2174/1745017901006010101
49. Christiansen D, Elklit A (2012) Sex differences in PTSD. In E Ovuga (Ed.). *Posttraumatic stress disorder in a global context* (pp.113-142). In Tech: open access book.
50. Wolf EJ, Lunney C, Schnurr PP (2016) The influence of the dissociative subtype of posttraumatic stress disorder on treatment efficacy in female veterans and active duty service members. *Journal of Consulting and Clinical Psychology*, 84: 95-100. doi: 10.1037/ccp0000036
51. Maercker A, Brewin CR, Bryant RA et al (2013) Proposals for mental disorders specifically associated with stress in the ICD-11. *Lancet*, 381:1683-1685. doi: 10.1016/S0140-6736
52. Elklit A, Hyland P, Shevlin M (2014) Evidence of symptom profiles consistent with posttraumatic stress disorder and complex posttraumatic stress disorder in different trauma samples. *European Journal of Psychotraumatology* 5. doi: 10.3402/ejpt.v5.24221
53. Cloitre M, Garvert DW, Brewin CR, Bryant RA, Maercker A (2013) Evidence for proposed ICD-11 PTSD and complex PTSD: a latent profile analysis. *European Journal of Psychotraumatology*, 4. doi: 10.3402/ejpt.v4i0.20706
54. Cloitre M, Garvert DW, Weiss B, Carlson EB, Bryant RA (2014) Distinguishing PTSD, Complex PTSD, and Borderline Personality Disorder: A latent class analysis. *European Journal of Psychotraumatology*, 5. doi: 10.3402/ejpt.v5.25097

Table 1

*Item mapping for DSM-5 PTSD symptoms*

DSM-5 Symptoms of PTSD		HTQ and TSC items
B1. Intrusive thoughts	HTQ1	Recurrent thoughts or memories of the most hurtful or terrifying events
B2. Distressing dreams	HTQ3	Recurrent nightmares
B3. Dissociate reactions	HTQ2	Feeling as though the event is happening again
B4/5. Emotional reactivity and physiological reactivity	HTQ16	Sudden emotional or physical reaction when reminded of the most hurtful or traumatic events
C1. Efforts to avoid thoughts	HTQ15	Avoiding thought or feelings associated with the traumatic or hurtful events
C2. Efforts to avoid reminders	HTQ11	Avoiding activities that remind you of the traumatic or hurtful event
D1. Trauma related amnesia	HTQ12	Inability to remember parts of the most hurtful or traumatic events
D2. Negative beliefs about oneself	HTQ14	Feeling as if you don't have a future
D3. Self-blame	HTQ19	Blaming yourself for the things that have happened
D4. Negative emotional state	HTQ23	Feeling ashamed of the hurtful or traumatic events that have happened to you/ HTQ21. Feeling guilty for having survived/ HTQ31. feeling guilty for not doing anything or not doing enough
D5. Diminished interest in activities	HTQ13	Less interest in daily activities
D6. Detachment	HTQ4	Feeling detached or withdrawn from people
D7. Inability to feel positive emotions	HTQ5	Unable to show emotions
E1. Irritability/anger	HTQ10	Feeling irritable or having outburst of anger
E2. Reckless or self-destructive behavior.	TSC21	Do you want to harm yourself physically?
E3. Hypervigilance	HTQ9	Feeling on guard
E4. Exaggerated startle response	HTQ 6	Feeling jumpy and easily startled
E5. Difficulty concentrating	HTQ7	Difficulty concentrating
E6. Sleep disturbance	HTQ8	Trouble sleeping
Depersonalization	TSC32	Do you sometimes feel as you are outside your body?
Derealization	TSC30	Do you have a sense of unreality?

*Note.* HTQ (Harvard Trauma Questionnaire), TSC (Trauma Symptom Checklist). PTSD symptoms are assessed with the HTQ in accordance with Hansen et al. (29).

Table 2

*Descriptive statistics and class comparisons for the whiplash and incest samples*

	Whiplash total sample  ( <i>M</i> ± <i>SD</i> )	Whiplash Dissociative PTSD class  ( <i>M</i> ± <i>SD</i> )	Whiplash Non- dissociative PTSD class  ( <i>M</i> ± <i>SD</i> )	Incest total sample  ( <i>M</i> ± <i>SD</i> )	Incest Dissociative PTSD class  ( <i>M</i> ± <i>SD</i> )	Incest Non- dissociative PTSD class  ( <i>M</i> ± <i>SD</i> )
Age	43.57±10.35	43.00±9.48	43.89±10.82	35.90±10.98	35.93±11.47	35.87±10.61
Male sex ( <i>n</i> ; %)	106; 22.27%	42; 24.28%	64; 21.12%	38; 12.22%	13; 9.42%	25; 14.45%
PTSD severity (HTQ)	12.29±2.62	<b>14.73±1.70</b>	<b>10.89±1.93**</b>	13.69±2.78	<b>16.08±1.39</b>	<b>11.78±2.03**</b>
Dissociation severity (TSC)	0.60±0.78	<b>1.26±0.06</b>	<b>0.22±0.52**</b>	0.85±0.83	<b>1.28±0.81</b>	<b>0.50±0.68**</b>
Rational coping (CSQ)	26.39±4.74	<b>25.61±4.69</b>	<b>26.84±4.72*</b>	23.90±4.87	24.10±4.76	23.73±4.97
Emotional coping (CSQ)	22.63±5.36	<b>26.53±4.68</b>	<b>20.40±4.37**</b>	26.30±5.30	<b>28.71±4.69</b>	<b>24.37±4.97**</b>
Social support (CSS)	27.00±8.37	<b>23.60±8.20</b>	<b>28.93±7.84**</b>	12.08±6.07	12.04±6.04	12.11±6.12
Attachment anxiety (RAAS)	15.63±6.10	<b>18.35±6.22</b>	<b>14.08±5.46**</b>	21.02±5.19	<b>22.01±5.06</b>	<b>20.22±5.18*</b>

*Note.* Harvard trauma questionnaire (HTQ), Trauma Symptom Checklist (TSC), Coping style Questionnaire (CSQ), Crisis Support Scale (CSS), and Revised Adult Attachment Scales (RAAS), values for each class are based on the most likely class membership (Whiplash dissociative *n* = 173; Whiplash non-dissociative *n* = 303; Incest dissociative *n* = 138; Incest non-dissociative *n* = 173). PTSD and dissociation scores reflect the mean number of positively endorsed items. Bold font in each line indicates a significant difference between the Dissociative and Non-dissociative PTSD class within each sample based on a two-tailed independent samples t-test (\* *p* < .01; \*\* *p* < .001).

Table 3

*Fit indices for the latent class models for the whiplash and the incest sample*

Whiplash sample					
Classes	AIC	BIC	SSABIC	Entropy	LMR-A (p-value)
1	10061.756	10149.230	10082.578	-	-
<b>2</b>	<b>9629.903</b>	<b>9809.016</b>	<b>9672.539</b>	<b>0.758</b>	<b>472.371</b> <b>(0.0000)</b>
3	9562.200	9832.952	9626.651	0.720	110.885 (0.0425)
4	9530.356	9892.747	9616.622	0.764	75.289 (0.1455)
5	9501.465	9955.496	9609.545	0.720	73.507 (0.7749)
6	9479.009	10024.679	9608.903	0.760	65.970 (0.5388)
Incest sample					
Classes	AIC	BIC	SSABIC	Entropy	LMR-A (p-value)
1	6976.303	7054.838	6988.234	-	-
<b>2</b>	<b>6729.934</b>	<b>6890.745</b>	<b>6754.365</b>	<b>0.714</b>	<b>288.087</b> <b>(0.0000)</b>
3	6689.700	6932.786	6726.629	0.705	83.573 (0.4021)
4	6663.435	6988.797	6712.864	0.784	69.712 (0.2460)
5	6639.490	7047.127	6701.418	0.786	67.412 (0.4241)
6*	-	-	-	-	-

*Note.* AIC = Akaike information criterion; BIC = Bayesian Information Criterion; SSABIC = sample size adjusted Bayesian information criterion; LMR-A (p-value) = Lo-Mendel-Rubin-Adjusted likelihood ratio test value and associated significance level [2 Times the Loglikelihood Difference]. Non-convergence of the 6-class model indicated the extraction of too many classes. Bold font indicates the optimal model.

Table 4

*Odds ratios (95% confidence intervals) for risk factors for membership in the dissociative PTSD class relative to the non-dissociative PTSD class for the whiplash and incest samples*

	Whiplash	Incest sample
Predictors	Dissociative class	Dissociative class
Age	0.999 (0.970-1.029)	1.011 (0.976-1.047)
Rational coping	1.040 (0.971-1.114)	1.092 (1.018-1.172)*
Emotional coping	1.425 (1.299-1.562)**	1.313 (1.176-1.465)**
Social support	0.945 (0.899-0.992)*	1.031 (0.974-1.092)
Attachment anxiety	1.051 (0.989-1.117)	1.048 (0.969-1.134)
Male sex	1.172 (0.583-2.356)	0.563 (0.199-1.592)

*Note.* \*  $p < .05$ ; \*\*  $p < .001$



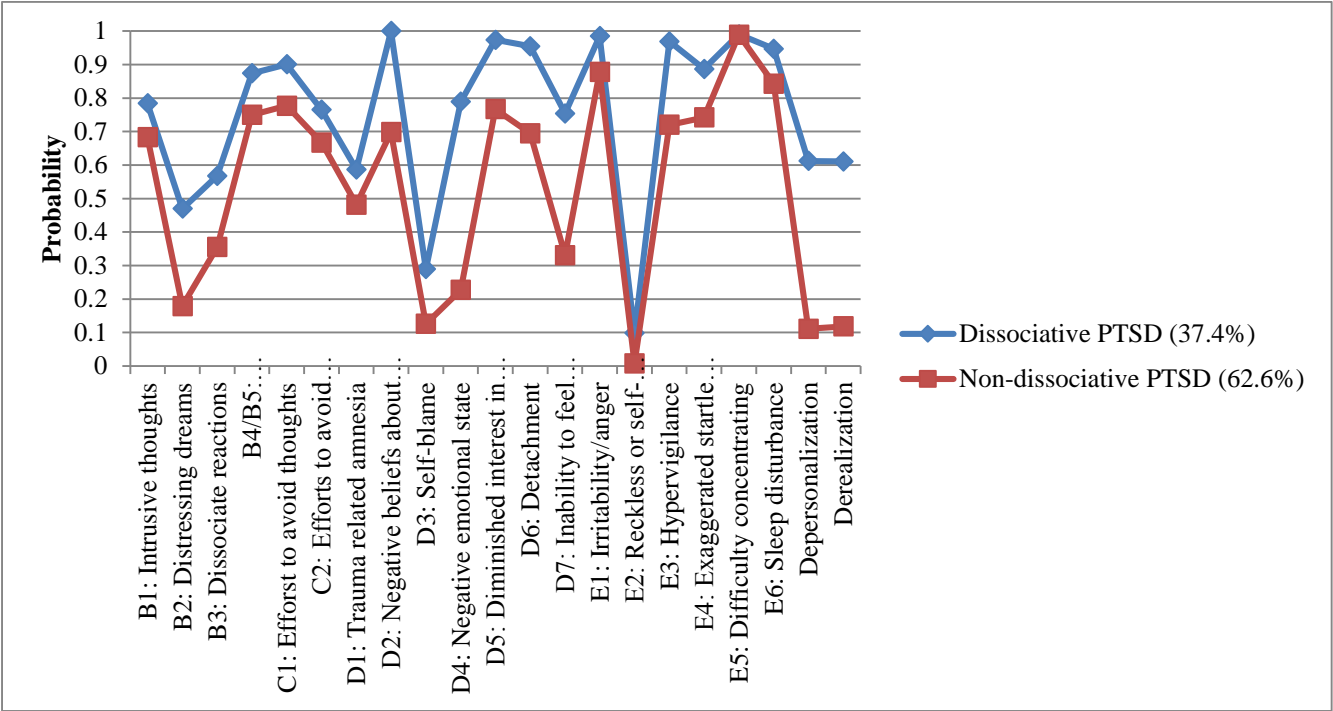


Figure 1

*Profile plot of the 2-class model for the whiplash sample*

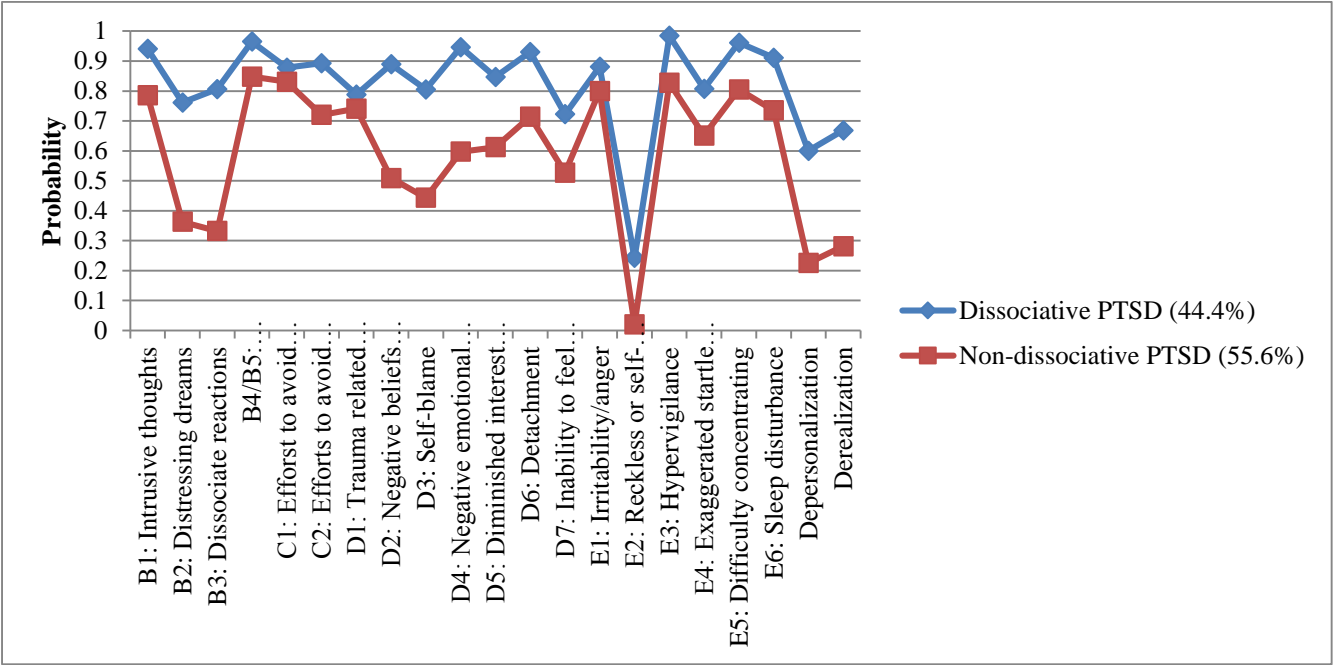


Figure 2

*Profile plot of the 2-class model for the incest sample*